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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Hiroshi Takiguchi

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EXAMINER

STEELE, AMBER D

ART UNIT

PAPER NUMBER

1639

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/796,103	Applicant(s) TAKIGUCHI ET AL.	
	Examiner Amber D. Steele	Art Unit 1639	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 February 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-18 is/are pending in the application.
- 4a) Of the above claim(s) 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9 and 11-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/29/08</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 29, 2008 has been entered.

Status of the Claims

2. The preliminary amendment received on March 10, 2004 amended claim 19.

The amendment to the claims received on August 29, 2007 amended claims 1, 2, 5, 18, 20, and 21 and canceled claims 24-25.

The amendment to the claims received on February 29, 2008 amended claims 1-4, 6-7, 9, 11-12, 14-16, and 18 and canceled claims 8 and 19-25.

Claims 1-7 and 9-18 are currently pending.

Claims 1-7, 9, and 11-18 are currently under consideration.

Election/Restrictions

3. In the replies received on November 27, 2006 and March 9, 2007, applicants elected with traverse a probe according to claim 3 wherein L^3 is a C_6 alkylene group and L^4 is a polyethylene glycol phosphate group as the species of probe; a compound according to formula (I) wherein L^1 is a C_6 alkylene group, L^2 is a single bond, and R is a hydroxyl group as the species of compound; and HS are hydrogen and sulfur, respectively. Claim 10 is withdrawn from further

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consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim.

Priority

4. The present application claims foreign priority to JP 2003-086362 filed March 26, 2003.

5. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file. However, a translation of JP 2003-086362 has not been provided.

Invention as Claimed

6. A method for immobilizing nucleic acid on a solid phase substrate by co-adsorption comprising: (a) forming a composition comprising a total concentration of 0.1 to 2 μ M of a nucleic acid as a probe and a compound or a salt thereof wherein the compound has a formula represented by HS-L¹-L²-R wherein L¹ is a single bond or a C₁₋₁₅ alkylene group; L² is a single bond, a nucleic acid, a polyethylene glycol group, -CO-NH-, or -NH-CO-; and R is a hydroxyl group, an amino acid group, a ferrocenyl group, or a carboxyl group, and L¹ and L² are not both single bonds, (b) then bringing the solid phase substrate into contact with the composition, and (c) incubating the composition in contact with a surface of the solid phase substrate wherein the composition comprises a nucleic acid and a compound represented by formula I at a ration of 40/60 to 60/40 and variations thereof.

Withdrawn Objections

7. The objections to claims 1-9 and 11-18 are withdrawn in view of the claim amendments received on February 29, 2008.

Withdrawn Rejections

8. The rejection of claims 1-7, 9, and 11-18 under 35 U.S.C. 102(b) as being anticipated by Peterson et al. The effect of surface probe density on DNA hybridization Nucleic Acids Research 29(24): 5163-5168, 2001 is withdrawn upon further consideration to the ratio limitation (please refer to the 35 USC 103 (a) rejection below and the answer to applicants' arguments).

9. The rejection of claims 1-7, 9, 11-13, and 17 under 35 U.S.C. 102(e) as being anticipated by Bawendi et al. U.S. Patent 6,855,551 filed April 12, 2001 (effective filing date September 18, 1998) is withdrawn upon further consideration to the ratio limitation (please refer to the 35 USC 103 (a) rejection below and the answer to applicants' arguments).

New Rejections

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-7, 9, and 11-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peterson et al., "The effect of surface probe density on DNA hybridization", Nucleic Acids Research 29(24): 5163-5168, 2001.

For present claims 1, 6-7, 9, 11-12, and 18, Peterson et al. teach methods for immobilizing nucleic acids on a solid phase substrate comprising (a) contacting a nucleic acid probe and a duplex (i.e. compound) of formula $\text{HSC}_6\text{-nucleic acid}$ (e.g. $\text{HS-L}^1\text{-L}^2\text{-R}$ wherein L^1

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is C₆, L² is a single bond, and R is natural hydroxyl on 3' end of nucleic acid) with a solid support and (b) incubating the probe, compound, and solid support wherein the concentration of the probe, target, and duplex solutions are 1 μM (please refer to entire document particularly Table 1 and Materials and Methods section). In addition, Peterson et al. teach mercaptohexanol (i.e. HS(CH₂)₆OH wherein HS-C₆-nucleic acid is a nucleic acid attached to MCH thus creating a 50:50 ratio; please refer to entire document particularly Materials and Methods section). Further regarding the 40/60 to 60/40 ratio limitation, applicants are respectfully directed to MPEP § 2144.05, section II. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Furthermore, it is noted that applicants disclosure states that the ratio can be from 1:99 to 99:1 depending on the desired density of nucleic acids on the surface (please refer to the present specification page 9).

For present claim 2, Peterson et al. teach ssDNA as the nucleic acid probe (please refer to entire document particularly Table 1).

For present claims 3-4, Peterson et al. teach 5' end of the nucleic acid probe as formula of HSC₆single bond or HSC₆spacer (e.g. HS-L3-L4 wherein L3 is C₆ and L4 is a single bond or spacer; please refer to entire document particularly Table 1).

For present claim 5, Peterson et al. teach a probe with nucleic acid (e.g. spacer; please refer to entire document particularly Table 1).

For present claims 13-15, Peterson et al. teach gold SPR substrate (e.g. gold on glass; please refer to entire document particularly Materials and Methods section).

For present claim 16, Peterson et al. teach probes 25 base pairs in length (please refer to entire document particularly Table 1).

For present claim 17, Peterson et al. teach incubation at room temperature (e.g. 25°C; please refer to entire document particularly Materials and Methods).

Therefore, the presently claimed invention is rendered *prima facie* obvious by the teachings of Peterson et al.

Arguments and Response

12. Applicants' arguments directed to the rejection under 35 USC 103 (a) as being unpatentable over Peterson et al. for claims 1-7, 9, and 11-18 were considered but are not persuasive for the following reasons. Please note: the arguments were for the 35 USC 102 rejection previously of record which is now a 35 USC 103 rejection based on the claim amendments.

Applicants contend that Peterson et al. does not teach mixing the MCH and nucleotide prior to adsorption onto the support.

Applicants' arguments are not convincing since the teachings of Peterson et al. render the method of the instant claims *prima facie* obvious. Specifically, Peterson et al. teach adsorbing HS-C₆-nucleic acid to the support (i.e. MCH linked to nucleic acid; please refer to the entire reference particularly Table 1 and the Materials and Methods section). While Peterson et al. also utilized a second adsorption step wherein only MCH is utilized, this step is to stabilize and remove any non-specifically bound HS-C₆-nucleic acid molecules (please refer to Herne et al.,

“Characterization of DNA Probes immobilized on Gold Surfaces” J. Am. Chem. Soc. 119: 8916-8920, 1997, Figure 4 or Levicky et al., “Using Self-Assembly to Control the Structure of DNA Monolayers on Gold: A Neutron Reflectivity Study”, J. Am. Chem. Soc. 120: 9787-9792, 1998, Figure 1 for better illustrations; citation numbers 6 and 18 of Peterson et al.; Herne et al. provided by applicants in the IDS also).

13. Claims 1-7, 9, 11-13, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bawendi et al. U.S. Patent 6,855,551 filed April 12, 2001 (effective filing date September 18, 1998).

For present claims 1, 3-4, 6-7, 9, 11-12, Bawendi et al. teach methods of making semiconductor nanocrystals/quantum dots comprising (a) bringing a quantum dot (e.g. solid phase substrate) into contact with nucleic acid probes including HS-alkylene-PEG wherein alkylene is C₆ and a HS-alkylene-hydroxyl compound wherein the alkylene includes C₆ and (b) incubating the solid phase and the nucleic acid and HS-alkylene-hydroxyl compound (please refer to the entire specification particularly abstract; Figures 3-4, 6, 8-9; columns 4-14; Examples 1-10). Regarding the 40/60 to 60/40 ratio limitation, applicants are respectfully directed to MPEP § 2144.05, section II. Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Furthermore, it is noted that applicants disclosure states that the ratio can be from 1:99 to 99:1

depending on the desired density of nucleic acids on the surface (please refer to the present specification page 9).

For present claim 2, Bawendi et al. teach DNA and RNA (please refer to the entire specification particularly columns 4, 6-7, 9-14).

For present claim 5, Bawendi et al. teach polyethylene glycol (please refer to the entire specification particularly column 8).

For present claim 13, Bawendi et al. teach quantum dots made of metal (please refer to the entire specification particularly column 5; Examples 1-2).

For present claim 17, Bawendi et al. teach room temperature (e.g. 25°C; please refer to the entire specification particularly Examples 9-10).

Therefore, the presently claimed invention is rendered *prima facie* obvious by the teachings of Bawendi et al.

Arguments and Response

14. Applicants' arguments directed to the rejection under 35 USC 103 (a) as being unpatentable over Bawendi et al. for claims 1-7, 9, and 11-17 were considered but are not persuasive for the following reasons. Please note: the arguments were for the 35 USC 102 rejection previously of record which is now a 35 USC 103 rejection based on the claim amendments.

Applicants contend that Bawendi et al. does not teach the ratio of 40:60 to 60:40..

Applicants' arguments are not convincing since the teachings of Bawendi et al. render the method of the instant claims *prima facie* obvious. Regarding the 40/60 to 60/40 ratio limitation, applicants are respectfully directed to MPEP § 2144.05, section II. Generally, differences in

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concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical.

“[W]here the general conditions of a claim are

disclosed in the prior art, it is not inventive to discover the optimum or workable ranges

by routine experimentation.” *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Furthermore, it is noted that applicants disclosure states that the ratio can be from 1:99 to 99:1 depending on the desired density of nucleic acids on the surface (please refer to the present specification page 9).

Future Communications

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amber D. Steele whose telephone number is 571-272-5538. The examiner can normally be reached on Monday through Friday 9:00AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James (Doug) Schultz can be reached on 571-272-0763. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Amber D. Steele/
Patent Examiner, Art Unit 1639

May 14, 2008